HONOLULU

LA JOLLA

TIBURON

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - MARCH 1976

RESEARCH HIGHLIGHTS

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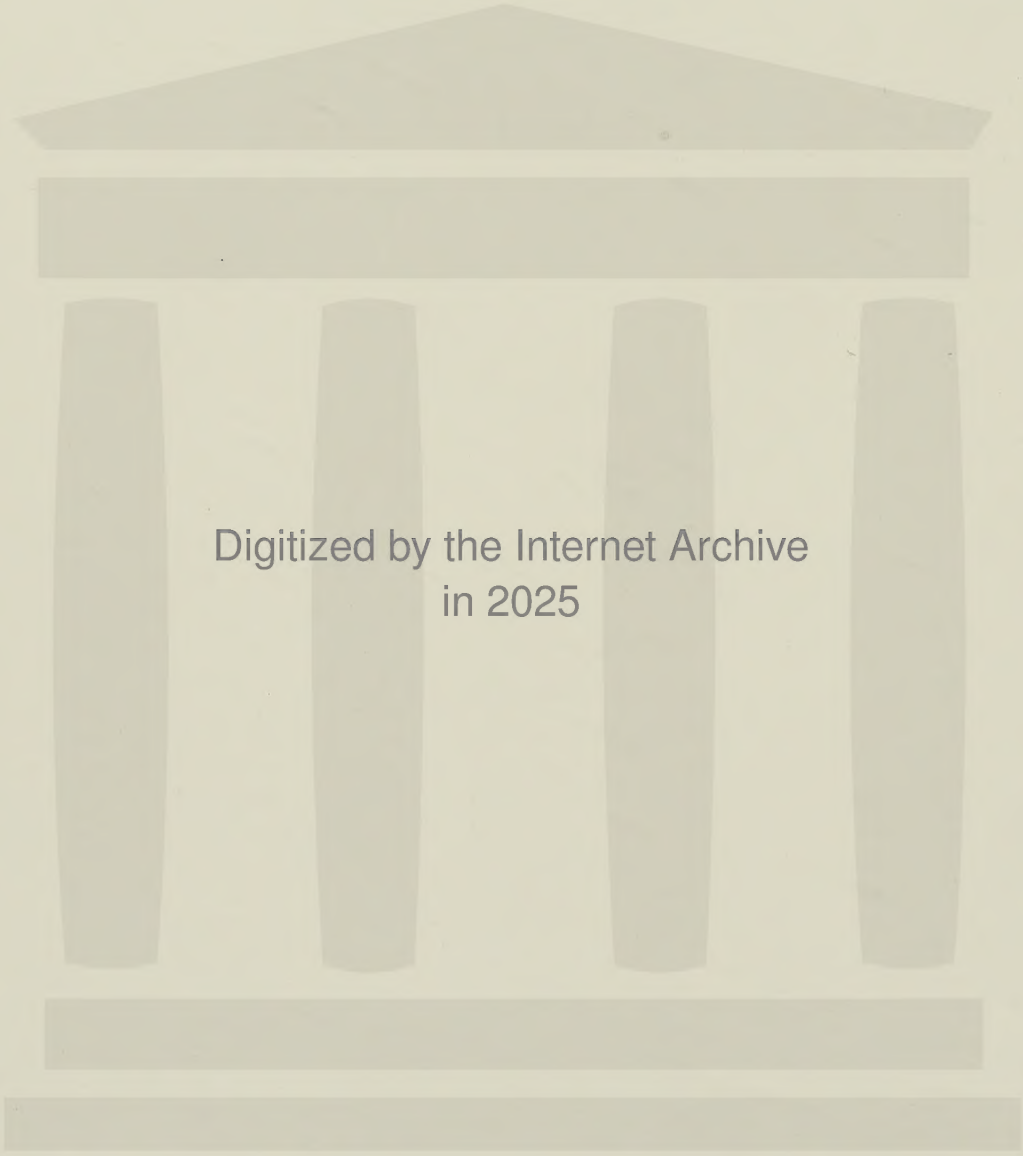
NOAA/NMFS



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SOUTHWEST FISHERIES CENTER
La Jolla, California

Honolulu Laboratory
La Jolla Laboratory
Tiburon Laboratory

MONTHLY REPORT - MARCH 1976

STATUS OF PUBLICATIONS

Published

Li, H. W., and P. B. Adams. 1976. Three computer simulation games for the instruction of population dynamics. Am. Fish. Soc. Bull. 1(1): 22 p.

Computer simulation games were developed based on three commonly used fisheries models, Schaefer's surplus yield model, Ricker's spawner-recruit model, and Beverton and Holt's dynamic pool model. Through using the games, the player is placed in a realistic management situation and forced to deal with interaction of biological factors and economic pressures which characterize fishery management decisions. The games also give the player the opportunity to investigate the critical assumptions of the different models. No previous experience with computers is required in order to play the games.

MacCall, Alec D., Gary D. Stauffer and Jean-Paul Troadec. 1976. Southern California recreational commercial marine fisheries. Mar. Fish. Rev. 38(1): 1-32.

Ahlstrom, E. H. 1976. Maintenance of quality in fish eggs and larvae collected during plankton hauls. In H. F. Steedman (ed.), Zooplankton fixation and preservation. Monographs on Oceanographic Methodology, pp. 313-318.

This report does not constitute publication and is for information only.

Approved by Center Director

"Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: Kinds, distributions, and early life histories and observations on five of these from the northwest Atlantic" by Elbert H. Ahlstrom, John L. Butler and Barbara Y. Sumida. For publication in the Bulletin of Marine Science.

"Study, with ultrasonic tracking techniques, of the small-scale movements of albacore Thunnus alalunga (Bonnaterre)" by R. Michael Laurs, Heeny S. H. Yuen and James H. Johnson. For publication in the Fishery Bulletin, U.S.

"Taxonomy of hake, Merluccius spp., which spawn in waters around Baja California, Mexico" by C. P. Mathews and A. M. Vrooman. For publication in the Fishery Bulletin, U.S.

"Acute toxicity of six monocyclic aromatic crude oil components to striped bass (Morone saxatilis) and by shrimp (Crago sp.)" by P. Benville and S. Korn. For publication in California Fish and Game.

HONOLULU LABORATORY

FISH ENVIRONMENT INVESTIGATIONS

Effect of Temperature on the Speed of Contraction of White Muscle of Skipjack Tuna Reported

During March the Experimental Ecology of Tunas group under the direction of Dr. Andrew Dizon at the Honolulu Laboratory collected the first experimental evidence of a possible reason for tunas being warm-bodied. University of Hawaii graduate student Richard Brill completed studies concerning the effect of temperature on the speed of contraction of isolated white muscle samples from skipjack tuna, Katsuwonus pelamis. Five fish were used, with up to eight muscle samples taken from each. Each muscle sample was tested at three different temperatures, 20°, 27°, and 34°C, with the order of temperature randomized, and five measurements were taken at each temperature.

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The muscle blocks were mounted horizontally in a controlled temperature bath containing Ringer's solution, and their movements recorded with an optical sliding-wedge transducer connected to an oscilloscope. The face of the oscilloscope was photographed with a 35-mm camera.

Preliminary analysis of the data indicates that the time from the stimulus to maximum height of contraction is the best indicator of the speed of contraction, since it is apparently independent of the degree of muscle preloading or stimulus strength. Furthermore, the time to the maximum height of contraction of white muscle has been reported to give the best indication of a fish's maximum burst swimming speed. (See Wardle, C. S., Nature 255:725-727, 1975).

Results so far indicate that a change in test temperature from 20° to 27°C causes a 40% increase in the speed of contraction, while a change from 27° to 34°C causes a 30% increase in the speed of contraction. Similar tests on two kawakawa, Euthynnus affinis, had identical results.

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Graduate student Walter Ikehara continued his study of responses of tunas to odor gradients. The Department of Microbiology of the University of Hawaii has volunteered to analyze rinses of four prey fishes; dramatic behavioral responses by the tunas have been observed for three of the four rinses.

Scheduled Yellowfin Tuna Tracking May Be Delayed

Fishery Biologist Heeny Yuen completed arrangements with officials of the Hawaiian International Allison Tuna Tournament (HIATT) to carry out yellowfin tuna tracking in April. The charter boat Kamome was scheduled, but the owner withdrew its availability. HIATT is now looking for another boat to use in the tracking effort. If the tracking cannot be done in the first half of April, it will be postponed until after Cruise TC 76-04 (Townsend Cromwell Cruise 71), which is to end June 10.

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Mr. Yuen is continuing with the planning and preparation of Cruise TC 76-04, scheduled for May 3 to June 10. The first half of the cruise will be to the northwestern Hawaiian Islands for a preliminary survey of the resources and environments of birds and the inshore marine fauna. The objective of the survey, which will be made in cooperation with the Hawaii State Division of Fish and Game and with the Interior Department's Fish and Wildlife Service, is to obtain information for designing the assessment studies.

Tracking of large skipjack tuna tagged with pressure sensing and reporting transmitters will be the activity for the second half of the cruise. The skipjack tuna will be continuously monitored for data on swimming depth and activity. These data will be part of the information needed to test the hypothesis that the length of time skipjack tuna can survive in temperatures of the upper mixed layer is dependent on their size and activity.

TUNA ASSESSMENT AND DEVELOPMENT INVESTIGATIONS

Plans Developed for an Improved Baitfish Transport System Via Roll-On/Roll-Off Vessels

Plans are being developed to implement a revised system of transporting northern anchovy from California to Hawaii. Based on past experience with the tank-trailer system and the results of initial holding experiments carried out at the Tiburon Laboratory last fall, it appears that the high mortality encountered in transporting the anchovy is closely related to the amount of handling to which these fish are subjected. Additional evidence that the tank-trailer system is inadequate, because it involves direct handling (dry scooping or bucketing, of baitfish), was the high mortality encountered several times last summer when transporting threadfin shad from the Wahiawa Reservior to holding tanks at Kewalo Basin, a distance of about 16 miles. Previous experience in transporting threadfin shad using small fiber glass tanks with minimal handling resulted in mortalities of around 15%. The mortality of threadfin shad using the anchovy tank-trailer system exceeded 50%. In December 1975, initial plans were developed to overcome the handling problem. Project Leader Richard Shomura and Fishery Methods and Equipment Specialist Donald Aasted are currently working on a system that virtually eliminates direct handling of the baitfish. The system will include using a bait barge to collect anchovy directly from the bait dealer in San Francisco Bay, acclimating the baitfish in the bait barge, transferring the baitfish into newly designed circular transport tanks by swimming the fish through an umbilical cord system, and transporting the circular tanks

on a flatbed trailer aboard the roll-on/roll-off vessel. In Honolulu the circular tanks will be hauled to a new location only a short distance from the roll-on/roll-off pier. The change in offloading base will minimize the time the baitfish are held in a closed system; 5 minutes as compared to the previous 45 minutes transit time. The present schedule is to conduct trial shipments using this new system in July.

Emphasis on Manuscript Editing and Revisions

Most work in Dr. Robert Skillman's Tuna Monitoring and Assessment task this month centered around manuscript editing and revision. Dr. Skillman concentrated on the addition of a section on genetics to the manuscript "The biology, ecology, and resource of the skipjack tuna, Katsuwonus pelamis" by Walter M. Matsumoto and Robert A. Skillman. Mr. Richard Uchida continued to revise the retitled manuscript "Synopsis of biological data of frigate mackerels, Auxis thazard (Lacepede) 1802 and A. rochei (Risso) 1810." Both of these papers were presented as background documents for the FAO Ad Hoc Committee to review the biology and status of stocks of small tunas.

Mr. Uchida completed the paper "Pelagic fishes and fisheries of the Indian Ocean" in collaboration with Laboratory Director Richard Shomura. Mr. Shomura presented this paper along with a "Partial bibliography of tunas in the Indian Ocean, 1965-75" at the Biological Seminar of the Cooperative Investigations in the north and central Western Indian Ocean at the Kenyatta Conference Centre, Nairobi, Kenya.

At the request of the Director, Mr. Uchida also prepared a brief report reviewing and summarizing the baiting and fishing potential of the water surrounding Papua, New Guinea.

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Fishery Biologist Tamio Otsu completed a draft report of his recent trip to Japan where he attended the annual Japanese Tuna Conference in Shimizu to confer with a number of Japanese research and industry people on tuna fishery problems and research accomplishments.

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1976 Off to Respectable Start in Hawaiian Skipjack Tuna Fishery

The March 1976 catch of skipjack tuna in the Hawaiian fishery was estimated at 234.4 metric tons (MT), which was 71.2 MT above the catch for March 1975 and 107.6 MT more than the March average for 1948-75. The catch for the first quarter of the year was estimated at 511.9 MT. This was 18.4 above last year's catch for the same period and 156.2 MT above the long-term average.

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The lengths of 700 albacore from 14 vessels unloading in Pago Pago were recorded by Government of American Samoa employee Pulou Niuatoa during the period February 14 to March 26. He also collected 21 sets of catch and effort data. An average albacore size of 92.3 cm and a catch rate of 1.50 albacore per 100 hooks were calculated from data from five vessels.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ALBACORE FISHERIES PROGRAM

Aspects of Albacore-Related Research Presented at UC, Sea Grant-Sponsored Fishermen's Workshops

Dr. R. Michael Laurs, Leader of the Albacore Fisheries Program at the La Jolla Laboratory, was invited to make presentations at the UC Sea Grant-Sponsored Fishermen's Workshops in San Rafael and

Watsonville, California, on the evenings of March 17 and 18, respectively. He spoke on various aspects of the albacore-related research that is being carried on by NMFS including the cooperative work with AFRF, the population dynamics studies, and the uniform U.S. west coast albacore logbook. About 20 fishermen attended the San Rafael Workshop and 40 at Watsonville. The presentations were well-received and generated considerable discussion.

Loan of Satellite Navigation System Requested from NOS

Dr. R. M. Laurs and R. Lynn visited the NESS facilities at Redwood City, California, and met with J. Bottoms and L. Breaker to review satellite products. Some of these products will be available for the remote sensing and ground truth assessment experiments to be conducted aboard the Jordan during the upcoming albacore-oceanography survey in June.

Mr. Lynn requested loan of a satellite navigation system from NOS to obtain precision positioning during the June cruise. A justification was prepared describing the plan of a closely-spaced and detailed pattern of stations in about the subtropic front. Conventional systems would not meet the required precision for calculation of geostrophic velocities.

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Messrs. R. Lynn, L. Eber and K. Bliss visited the Scripps Institution of Oceanography (SIO) to review with Dr. Bainbridge the latest computer hardware and software systems that Scripps uses for processing oceanographic data. Dr. Bainbridge personally developed programs to process the new Jordan STD model 9040 and demonstrated it. They also visited the NORPAX computer facilities to explore the value of using the Berkeley computer link available at NORPAX.

Mr. Frank Lorey, a student in San Diego State University's Geography Internship Program, continued to work with members of the Albacore Fisheries Program primarily on the XBT data collected by three albacore jigboats which fished in the western North Pacific in 1975. In plotting vertical sections utilizing the XBT information, it was noted that the best catches were taken near temperature fronts

associated with the Transition Zone. Mr. Lorey also assisted Mr. R. Nishimoto in summarizing albacore tag recovery information and preparing scientific gear for the upcoming albacore survey cruises by two jigboats into western North Pacific waters.

STOCK AND RECRUITMENT PROGRAM

Advance in Technology of Rearing Mackerel Larvae Reduces Cannibalism

Dr. J. Hunter, Fishery Biologist, reported that he made an advance in the technology of rearing mackerel larvae which also provides some interesting insights into cannibalism in these larvae. In past experiments, survival from an initial stocking density of 3,000 eggs has been 2% or less. But in an experiment completed this month, 163 fish were grown to metamorphosis, which amounts to about 5% survival. The principal cause of mortality in past work was cannibalism by larger larvae on their smaller siblings. Cannibalism becomes marked when the mean length of larvae in the group reaches 8 mm and declines when they average 15 mm. At this length the fish have metamorphosed and are schooling. When the mean length of the group is 8 mm, the largest individuals (10 to 11 mm) prey intensively on the smallest larvae (5 to 6 mm). The experiment completed this month demonstrates that by rearing larvae at an elevated temperature (22°C) one can reduce the mortality caused by cannibalism. At 22°C, the period of intensive cannibalism lasts only 4 days (the time required to grow from 8 to 15 mm), whereas at 19°C the period last 7 days. Reducing the period of exposure to cannibalism by about half resulted in more than twice the survival at metamorphosis.

Three-Ship Experiment Uses New Devices to Defense Spatial and Temporal Microdistribution of Planktonic Food Organisms

A three-ship experiment to define spatial and temporal microdistribution of planktonic food organisms upon which larval anchovy feed was conducted for 2 weeks this month in the southern California Bight. One of the hypotheses to be tested by these studies was that stability of oceanographic conditions fosters small-scale layering

of plankton which concentrates the food of larval fish and thereby promotes good survival of larvae. Dr. Reuben Lasker was Cruise Leader aboard the NOAA R/V Townsend Cromwell and Dr. Robert Owen, the coordinator for the experiment, was Cruise Leader aboard the R/V David Starr Jordan. Dr. Richard Eppley of Scripps Institution of Oceanography's Food Chain Research Group was Cruise Leader aboard the R/V Alexander Agassiz of SIO.

A variety of measurements was made to determine vertical and horizontal microdistribution of dinoflagellates, diatoms, and zooplankton, and to determine micro and macrodistribution of associated environmental determinants (nutrients, oxygen, salinity, temperature, and particle concentrations). A number of new devices were used: a sea-surface skimmer developed by Dr. Edward Scura, a free-fall particle counter by Mr. Jack Brown, a sonic microprofiler by Dr. Richard Pieper of the University of Southern California, a new neuston net and a microprofile sampler by Mr. Dan Brown of SIO, another microprofile sampler (designed to hand either vertically or horizontally) by Dr. Robert Owen, diaphragm zooplankton pumps by Dr. Michael Mullin of SIO, and a high pressure liquid chromatograph applied to plant pigment analysis by Dr. C. Lorenzen of the University of Washington. All of these new devices and techniques were used to describe microdistribution of food organisms for larval fish and related parameters. Other equipment employed included phyto-pumps, a conductivity-temperature-depth instrument specially modified for Dr. Owen by the National Oceanographic Instrumentation Center, and STDs.

To assist in describing flow shear and rate of plankton patch displacement at the measuring sites, current meters were moored at four locations extending in and offshore from the primary measuring site. This work was done in cooperation with Drs. Terry Hendricks of the Southern California Coastal Water Research Project (SCCWRP) and Mizuki Tsuchiya of SIO.

Cooperating SIO scientists also made in situ measurements of primary productivity (Dr. O. Holm-Hansen), light attenuation (Mr. R. Booth), auto-radiography of phytoplankton (Dr. A. Carlucci), bacterial studies (Mr. F. Azam), phytoplankton division rates and identification

(Mss. F. Reid, S. Weiler and Dr. P. Chisholm), dissolved and particulate organic substances using a unique in situ filtration sampler (Dr. P. Williams), and zooplankton pumping on both vessels (Dr. M. Mullin).

During the first week the Jordan followed a drogue launched into the chlorophyll maximum zone, 2 miles off Cardiff, California, and measurements by Jordan scientists were made repeatedly at the southward moving drogue to determine local change of biological and physical characteristics. At the same time, the Cromwell scientists made similar measurements in a 5-mile cruciform pattern centering on the Jordan to determine small-scale field changes of properties, and the Agassiz scientists determined changes over the Los Angeles Bight.

During the second week, the Jordan remained at the current meter location, and scientists measured changes as plankton patches were advected past the meters. The scientists aboard the Cromwell continued measurements at greater distances, centering on the Jordan. The Agassiz, having completed their large-scale survey of the Bight, joined the Jordan and Cromwell, and Dr. Eppley coordinated nitrogen-metabolism experiments in the study area. At the end of the month, Mr. Thrailkill made an extensive survey of the Los Angeles Bight for fish larvae and phytoplankton distribution on the R/V Cromwell.

Preliminary results show that vertical microdistribution of particles in the chlorophyll maximum zone was stable for at least 3 weeks during the anchovy spawning season, despite a marked increase in wind velocity for a short period during the first week of the experiment. Thus, it appears the layering of food particles, upon which larval anchovy depend, is maintained even during periods of moderate wind stress.

Dr. Hunter and Ms. Sanchez completed a 1-week cruise on the David Starr Jordan to study the effects of predation by adult anchovy on their eggs and larvae. Areas where anchovy schools were concentrated were identified by Mr. James Squire through aerial search and radio contact with the fishermen. These areas were sampled intensively with the midwater trawl to collect anchovy adults and plankton nets to collect eggs and larvae. Shipboard examination of the catch indicated that eggs and larvae were abundant in these shoal areas and that some of the adult fishes had preyed upon their own eggs. On the same cruise, Mr. David Kramer collected anchovy larvae to ascertain birth dates and growth rates from daily rings on the otoliths. Dr. Charles O'Connell collected anchovy larvae to determine by histological examination the proportion of larvae that were starving.

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Mr. Thrailkill, Fishery Biologist, reports that plankton samples taken in a cooperative study with scientists aboard the Soviet R/V Poseidon have been sorted for fish eggs and larvae. All hake have been removed and measured. The data are to be used by Dr. Paul E. Smith to calculate the current year's spawning biomass of hake off the Pacific coast.

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A study supported by MARMAP to compare plankton catches by bongo and standard CalCOFI nets is almost complete According to Mr. Thrailkill, 120 samples have been volumed, sorted for fish eggs and larvae, and for 17 functional groups of invertebrates. Specialists at the Scripps Institution of Oceanography have been sent invertebrates which they have agreed to identify.

Paper Completed on Induction of Spawning
Captive Pacific Mackerel

Fishery Biologist Roger Leong of the La Jolla Laboratory reports that he completed a paper entitled "Maturation and induced spawning of captive Pacific mackerel, Scomber japonicus." The manuscript will be sent to the editor of the Fishery Bulletin for review following final typing. The paper describes the maturation of mackerel under different light-temperature conditions, the effectiveness of various hormones for induction of spawning, and a procedure for spawning mackerel on demand throughout the year. Findings were as follows:

> Pacific mackerel, Scomber japonicus, became sexually mature under laboratory conditions and were induced to spawn with hormone injections. Fish caught before the major spawning season became mature under the natural photoperiod and under artificial photoperiods of 4 light, 20 dark (4L20D), 8L16D, and 16L8D. Mackerel caught near the end of the spawning season developed their gonads more rapidly at 18°C than at 15°C or ambient temperature. A 16° C-14L 10D environment was effective in maintaining mackerel in spawning condition beyond the normal spawning season. Any of three combinations of hormones induced spawning: gonadotropin from salmon pituitary extract (SP) followed 24 hours later by gonadotropin from pregnant mare serum (PMS); human chorionic gonadotropin (HCG) followed 24 hours later by PMS: and SP plus HCG followed 24 hours later by SP plus HCG plus PMS. The hormones did not induce spawning when used individually.

ECOLOGY OF THE CALIFORNIA CURRENT PROGRAM

MARMAP Course on Identification of Fish Eggs and Larvae

Dr. Elbert Ahlstrom, Senior Scientist, reports that the chief activity of the ichthyoplankton group was conducting a MARMAP-sponsored concentrated course on identification of fish eggs and larvae. The 4-week course began on March 22. Twenty-one persons were enrolled in the class on a full-time basis and several additional persons audited the course. Ten of the participants were from foreign countries: Mexico (3), Poland (2), Nigeria (2), El Salvador (1), Brazil (1), and India (1). Of the remainder, 6 were NMFS employees [Panama City, Florida Laboratory (1), Sandy Hook, New Jersey Laboratory (2), La Jolla Laboratory (2), and Seattle (1)], and 5 were from colleges or universities doing Sea Grant or related research involving fish eggs and larvae. Twelve life history series were studied per day on 18 of the 20 class days. On the remaining 2 days practice was afforded on identification using CalCOFI samples, or samples brought by the participants.

During the course, 216 life history series were studied representing 98 fish families. For each day's work each participant was provided with a table of the meristics of the species being studied, pertinent references covering both adults and described life history series, and a series of illustrations of the species being studied (or of closely related species). Dr. Ahlstrom notes that additions have gradually been made to the series of illustrations. For some series, illustrations from several sources were used. Among the illustrations given to the participants, 47 are from published papers by Ahlstrom, Moser, et al.; 53 are original unpublished illustrations (of which 15 are included in manuscripts currently in press); and 139 are copied from published accounts by other workers. The participants have various backgrounds - some are at the Ph.D. level, others are at the Masters level, and most have an AB or equivalent.

Some work also continued this month on regular research projects - including studies of flatfishes, assembling data for a CalCOFI Atlas on rockfish larvae, and revision of a MS dealing with scorpaenid larvae.

Participants in the Larval Fish and Egg Identification Course taught by Dr. Elbert H. Ahlstrom; Southwest Fisheries Center, La Jolla, California; March 22 to April 16,1976.

1. Susan Roberts - NMFS, Sandy Hook Laboratory, Highland, N.J.
2. William Karp - University of Washington, Seattle, WA.
3. John Butler - NMFS, SWFC, La Jolla, CA.
4. Marty Stevenson - Moss Landing Marine Laboratory, Moss Landing, CA.
5. Angeles Alvarino - NMFS, SWFC, La Jolla, CA.
6. Beverly Vinter - NMFS, NWFC, Seattle, WA.
7. David Arthur - NMFS, SWFC, La Jolla, CA.
8. Anthony Wilson - Lagos, Nigeria
9. Araceli Martinez - Mexico

10. Enrique Gonzalez - Mexico
11. Gloria Calderon - El Salvador
12. Leon Tissot - Mexico
13. Elizabeth Stevens - NMFS, SWFC, La Jolla, CA.
14. Chossi Sinque - Brazil
15. Vijayalakshmi Nair - India
16. Olayinka Bablola - Nigeria
17. Howard Powles - Marine Resources Research Inst., Charleston, SC.
18. Elaine Sandknop - NMFS, SWFC, La Jolla, CA.
19. Susan D'Vincent - NMFS, SWFC, La Jolla, CA.
20. Mike Fahay - NMFS, Sandy Hook Laboratory, Highlands, N.J.
21. Barbara Sumida - NMFS, SWFC, La Jolla, CA.
22. Elbert Ahlstrom - NMFS, SWFC, La Jolla, CA.
23. Darrel Snyder - Colorado State University, Fort Collins, CO.
24. Elzbieta Klis - Poland
25. Geoffrey Moser - NMFS, SWFC, La Jolla, CA.
26. Dennis Gruber - Scripps Institution of Oceanography, La Jolla, CA.
27. Maria Mackus - Poland
28. Alan Collins - NMFS, Panama City Laboratory, FL.

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Annual Gamefish Tagging Report Completed

Since 1963, Mr. J. Squire, Fishery Biologist at the La Jolla Laboratory, has been in charge of compiling statistics for the marine game fish tagging program in the Pacific conducted in cooperation with recreational fishermen. The 1975 annual report of activities was completed in March for distribution to 1,700 anglers participating in the program.

Mr. Squire reports that in 1975 the number of billfish tagged by marine anglers was slightly less than the number tagged in 1974 (1975 - 1,307 billfish; 1974 - 1,616 billfish). The total of all species tagged in 1975 was 1,486, down slightly from the 1,697 tagged in 1974.

Of the total number of billfish tagged (1,307), striped marlin accounted for 665 or 51% of the tagging (647 of these were tagged off Baja California, Mexico), black marlin 435 or 33% (433 off Australia),

sailfish 188 or 15%, blue marlin 18 or 1%, and one swordfish was tagged off southern California.

In addition to tagging the billfish species, marine anglers have been encouraged to tag yellowtail and roosterfish in the Gulf of California and about the lower one half of Baja California, Mexico. This year 61 roosterfish were tagged. Other species reported tagged were white sturgeon (35 in San Francisco Bay), skipjack tuna, queenfish, rainbow runner, bronze whaler, large scale tuna, shark (sp?), yellowtail, mako shark, turrum (jack), sand bass, and bluefin tuna.

An important step in obtaining additional tag recoveries from Japanese, Korean, and Taiwanese longline fishermen was the printing of new tag return posters in Japanese and Korean. A tag return poster is being planned for distribution in Taiwan.

Since the Japanese and Korean longliners actively fish for billfish throughout the Pacific, Mr. Squire has arranged to have specified collection points for recovered tags in Japan and in American Samoa, where many Korean longliners unload.

Oceanic Fisheries Resources Division

TUNA RESOURCES PROGRAM

Participates in Atlantic Skipjack Tuna Workshop

Dr. Gary Sakagawa, Fishery Biologist at the La Jolla Laboratory, traveled to Dakar, Senegal, to participate in an Atlantic Skipjack Tuna Workshop at the invitation of the Centre de Recherches Oceanographiques de Dakar-Thiaroye. The workshop was held March 2-22 to review available data and information on the population biology of Atlantic skipjack tuna and to assess the condition of the stocks. Scientists from France, Ghana, International Commission for the Conservation of Atlantic Tunas, Ivory Coast, Senegal, and Spain also participated. The draft report of the meeting states the preliminary analyses with available data show the stocks to be abundant and capable of yielding increased catch with increased effort. However, this assessment is not founded on a solid data base. The report points out the need for more rigorous analyses of the available data, better statistics from the fishery, and better information, e.g., estimate of growth, stock structure, and mortality on the population biology of the Atlantic skipjack tuna before a more accurate assessment of the condition of the stocks can be made. A research plan for obtaining the required information for an accurate assessment is included in the report.

Report Submitted to State/Federal Technical Committee on Uses of Economic Analyses in Fishery Management

Dr. Daniel Huppert, Economist at the La Jolla Laboratory, completed his assignment as Chairman of the Ad Hoc State/Federal Working Group on Fishery Economics. A 43 page report was submitted to the State/Federal Technical Committee outlining the uses of economic analyses in fishery management and recommending a program of data collection and bio-economic analysis for southern California fisheries.

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Also during March, Dr. Huppert began the development of a mathematical model which will be used to help evaluate the use of environmental monitoring. A stochastic dynamic programming technique will be used to examine whether optimum fishery management policies are likely to be improved through incorporation of environmental factors in stock assessment. The approach will rely heavily on surplus production-type models, and upon the assumption that environmental fluctuations are a source of random error in both fish stock growth and catchability.

Tuna Vessels Participate in FAX Program

During March, 30 U.S. seiners participated in the FAX program of the La Jolla Laboratory. Reporting rates for March were up from March 1975 by 11% as shown below.

March Reporting Rates

	Weather observations	XBT observations	Total
1975	101	20	121
1976	239	16	255
Percent change	+137%	-20%	+111%

The reporting rate for March 1976 was up significantly from that for March 1975. This large change in the reporting rate appears to have resulted from the imposition of the following quota in March in 1975. Consequently, most of the seiners were in port during this period. In March 1976, almost all of the fleet was at sea fishing prior to the quota which goes into effect in April.

In spite of this, XBT observations have been below the previous years' total for the past 3 months.

The tuna seiner, Caribe, led all cooperating vessels in March with 52 weather observations radioed to the Southwest Fisheries Center.

TUNA/PORPOISE PROGRAM

Jordan Cruise Results Note Extension of Porpoise Boundaries

Dr. Eric G. Barham, Supervisory Fishery Biologist and Chief Scientist aboard the NOAA research vessel, David Starr Jordan, during the porpoise boundary cruise conducted from January 5 to March 2 in the eastern Pacific, recently filed a report of preliminary results and observations during the trip.

With search methods similar to those employed in the commercial tuna fishery, the object of the cruise was to survey the suspected distributional boundaries of offshore porpoise populations in the eastern tropical Pacific. In particular, attention was given to investigation of porpoise distribution along regions of divergence and convergence of the equatorial currents and near oceanic islands. To the degree possible, the scientists attempted to identify to species all marine mammal sightings and estimate their numbers and to note association of birds and fishes with these populations. For possible correlation of the marine mammal observations with environmental parameters, the scientists measured the thermal and salinity regime with a series of expendable bathythermograph probes, surface salinity samples and continuous temperature-salinity recordings.

According to Dr. Barham, the Jordan covered about 11,400 nautical miles along a predetermined track. Weather permitting, about an 11-to 12-hour daily watch was maintained on the flying bridge from January 6 to February 29. Two sets of 20-power, 120 mm spotting scopes, one pair mounted to starboard and the other to port, were used to search the horizon and distant areas for bird flocks and marine mammal signs. The height of the glasses above the water was about 40 feet and under optimum conditions, visibility was possible to about 12 miles. The furthest marine mammal observation however, was estimated to be about 9 miles. The effectiveness of the search effort was greatly influenced by conditions of wind, sea, sun glitter, haze, and clouds. In an attempt to equate these environmental conditions with the observed results, a daily effort

and weather log was maintained. The search effort was considerably hampered by adverse environmental conditions during the cruise.

Eight species of dolphins were observed and identified. In addition, several dolphin sightings were unidentified to species. Four small-to-medium-sized whale species were noted, plus one category or grouping of unidentified beaked whales. One species of large whales was positively identified and two additional general groups were observed and enumerated.

Of the 17 schools sighted of the spotted dolphin (Stenella attenuata), 10 were located between 07°N and the equator and about 100°W. These schools represent a southerly extension of the known distribution of the offshore stocks. The most northerly school noted, southwest of the Revillagigedo Islands on January 9, also represent a slight extension of the known distribution.

The four most westerly schools seen, bounded by about 128° to 122°W and 06° to 03° N, carried huge flocks of birds, and large yellowfin jumpers were seen with two of these schools.

Coloration differences were noted in the two spotted dolphin schools observed on February 22 just north of the equator. In these schools the degree of spotting was medium to sparse in adult-sized animals and the marginal line of their cape pattern was very distinct. This coloration is considered to be more characteristic of spotted dolphins previously observed considerably further west.

Four of the 17 schools of the spotted dolphin were noted in association with lesser numbers of other dolphin species.

Seven schools of the spinner dolphin (Stenella longirostris) were observed. Three of these schools were identified as the eastern type stock. The school seen mixed with spotter dolphin at about 17°N, 118°30'W represents an extension of the historical distribution.

Four of the seven schools were classified as whitebelly spinners. All of these observations were slightly outside the historically understood boundaries. However, the three observations made at about 05° to 06°S appear, from color pattern differences, to be a separate stock from those normally encountered in the far offshore waters from approximately 800 km offshore to 140°W longitude.

During the course of this cruise, the 33 striped dolphin (Stenella coeruleoalba) schools observed tended to be small, numbering about 100 animals or less in 25 of the 33 observations; the largest school noted consisted of only about 500 animals. These small groupings appear to be traveling schools rather than feeding or resting aggregations. While running, the "streaker" schools exhibit a considerable degree of leaping which creates conspicuous splashes and leaves a well-defined wake behind them reminiscent of Delphinus schools.

The five schools noted south of the equator represent an extension of the previously published distribution of these porpoises in the eastern tropical Pacific.

Of the 37 schools of common dolphin (Delphinus delphis), 15 were comprised of about 100 or fewer animals. However, four schools were estimated to contain over 1,000 animals. Two schools were mixed with lesser concentrations of striped dolphin, and 12 schools were associated with birds. No surface indications of fish were noted in relation to Delphinus schools.

At least two major areas of concentration of the common dolphin were noted: one in the local banks-Clarion Island region; the other in the Galapagos-equatorial region.

Other cetacean sightings included Fraser's dolphin (Lagenodelphis hosei), one school of about 300-400 animals; rough-toothed dolphin (Steno bredanensis), one school of 30-40 animals; pygmy killer whale (Feresa attenuata), one small school of 10-14 animals of this species; five sightings of unidentified beaked whales; 12 schools of bottlenose dolphin (Tursiops truncatus); 16 schools of Risso's dolphin (Grampus griseus); short-finned pilot whale (Globicephala macrorhyncus). These sightings were generally correlated with the noted distribution of sperm whales. All pilot whale aggregations were small schools of 70 or less individuals.

Four sightings were made of the killer whale (Orcinus orca) adjacent to, or east of the Galapagos Islands.

Also noted were 12 sightings of sperm whale (Physeter catodon). The largest aggregations observed were made up of about 25 individuals. Only three sightings of minke whales were made. There were nine sightings of unidentified dolphins--probably most were Tursiops.

Dr. Barham noted that communications between the Jordan and the NOAA research vessel, Townsend Cromwell, which also participated in the porpoise boundary cruise and Commerce-licensed radio station WWD at Scripps were excellent, and greatly aided coordination of joint operations between the ships and the Southwest Fisheries Center.

NMFS/Tuna Industry Continue Preparations for Cooperative Study of Porpoise Saving Gear

In early March, a memorandum of understanding was signed by Dr. Fox, Chief of the Oceanic Fisheries Resources Investigations at the La Jolla Laboratory, and Mr. F. Alverson of LMR, Inc., representing the tuna industry-sponsored Porpoise Rescue Foundation regarding the list of tuna purse seiners qualified to carry NMFS gear technicians for the cooperative study of fishing gear and techniques designed to reduce porpoise mortality in the eastern tropical Pacific yellowfin tuna fishery.

The placement of the "Bold Contender" or "small-mesh system" will be on a managing owner's/captain's preference basis rather than on the random selection originally planned.

By month's end, Mr. John Everett, Porpoise Program Manager at the La Jolla Laboratory, reported that all aspects of the cooperative gear study between NMFS and the tuna industry were progressing satisfactorily with all but one vessel lined up to carry the Bold Contender system. During March four tuna vessels completed installation of the system and sailed for the fishing grounds. All of the webbing for the modifications purchased by NMFS and the webbing purchased by the tuna industry has been delivered and is being prefabricated by the NMFS gear technicians to facilitate placement aboard the ships.

The Bold Contender plus 19 other tuna purse seiners are participating in the series of test cruises beginning in May 1976.

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Mr. Everett also reported that funding for the Tuna Porpoise Program at the La Jolla Laboratory has been increased by an additional $160,000 for planned work on porpoise behavior, additional gear work, reading of porpoise teeth for estimates of aging, and studies to improve estimation of porpoise school sizes from aircraft. This funding matches on a 2:1 basis an additional $80,000 committed to porpoise research by the tuna industry.

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On March 29, Dr. Andrew Kemmerer and Mr. P.C. Cook from Bay St. Louis, Mississippi and Mr. Paul Sund, representing the Pacific Environmental Group at Tiburon, met with the staff of the Porpoise Program to consult on the estimation of porpoise school size, specifically to help develop correlations between aircraft visual sightings and the actual numbers of porpoise, for use in estimating porpoise abundance.

TIBURON LABORATORY

COASTAL FISH COMMUNITIES INVESTIGATIONS

Impact of Grazing Sea Urchins on Fishes and Other Marine Organisms Under Study

During this month, Dr. Edmund Hobson, Project Leader, and Fishery Biologist Tony Chess, continued their study of collections from representative southern California nearshore habitats at Santa Catalina Island. Having completed their analysis of samples from sandy bottom, and from fields of low brown algae, they turned to samples from those areas where a dense mat of coralline algae (predominantly Calliarthron) overgrows a rocky sea floor. This series of collections is of special interest because they cover a period when sea urchins, Strongylocentrotus franciscanus, progressively grazed most of the coralline algae from the rocks in the primary study area. The samples of the biota (made with nets, dredges, coring devices, and air-lift) should consequently document changes in benthic invertebrates related to this loss of algal cover. Furthermore, the assessments of the fish populations, based on direct counts made along with each sample, should show the impact of these changes on the fishes.

PHYSIOLOGY INVESTIGATIONS

Striped Bass Program-Qualitative Population Model Expanded

Portions of the qualitative model of the striped bass population, jointly prepared by agencies involved with striped bass research, are being expanded by Dr. Jeannette Struhsaker, Chief, Physiology Investigations, and Mr. Mickey Eldridge, Fishery Biologist at the Tiburon Laboratory. This involves a more comprehensive modelling of potential effects of variations in food organisms of the striped bass larvae.

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A cooperative study with Dr. Welton Lee of the California Academy of Sciences is being planned by Dr. Struhsaker. The objectives of the study involve the identification of pigments (particularly carotenoid complexes) in eggs and larvae of striped bass, developmental and environmentally-induced changes in pigments, and their functional significance. The color and intensity of the pigment in the ovarian eggs has been observed to vary between individual females and throughout embryonic and larval development. Pigments may have significance in larval metabolism and survival of the early stages.

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The experimental laboratory for the rearing of striped bass larvae and the study of the effects of different food regimes is essentially complete. New heating, water tables and test containers have been installed. Only the lighting system remains to be completed.

Proposal Submitted to EPA for Study of Ultraviolet Light on Fish Eggs and Larvae

A proposal was submitted to the EPA in conjunction with the La Jolla Laboratory, Southwest Fisheries Center, to study the effects of ultraviolet light of fish eggs and larvae. The staff of the Physiology Investigations Program at the Tiburon Laboratory has proposed to concentrate their studies on field characterization of the ultraviolet environment in nursery areas of striped bass and Pacific herring and laboratory studies of ultraviolet effects on their eggs and larvae. John Norton, University of California at Davis, will cooperate in this study, if and when funded.

Petroleum Effects Program--Oil Proposal Approved Pending Changes in Work Statement and Budget

The proposal submitted to the Outer Continental Shelf Environmental Assessment Program, Environmental Research Laboratories, NOAA, entitled "Transport, retention and effects of toxic petroleum hydrocarbons in experimental food chains", has been approved pending certain changes in the final work statement and proposed budget. Dr. Jeannette Struhsaker has completed and returned the work statement and transfer of funds is expected shortly. The total period of the approved proposal will be 18 months and the total amount granted $250,000. The research will concentrate on benthic food chains, including starry flounder, dungeness crab, and razor clams, and will be performed in the Physiology Investigations Program at the Tiburon Laboratory of the Southwest Fisheries Center.

COASTAL FISHERIES INVESTIGATIONS

Recreational Rockfish--Rockfish Field Guide in Preparation

Mr. Susumu Kato, Fishery Biologist (Research), reported that through the cooperation of researchers from NMFS, Scripps Institution of Oceanography, San Diego State University and the California Academy of Sciences, colored slides have been compiled of nearly all the California species of Sebastes. The slides will be used as an aid to identification, and will serve as the nucleus for a simplified field guide to rockfish.

Local Fisheries Development--Commercial Sea Urchin Landings on the Increase

Preliminary figures just published by the California Department of Fish and Game show that sea urchin landings in 1975 again ranked ninth in the commercial fish landings (excluding tropical tunas). The total landings 7.3 million pounds, would probably have been higher were it not for unfavorable market conditions in Japan in early 1975.

Rockfish Analysis--Simulation Project Begun of Multi-Species Complexes

Mr. Peter Adams, Operations Research Analyst at Tiburon, has begun a simulation project management of multi-species complexes. The initial stage of the project consists of an analysis of presently available information on trends in life history characteristics of California coastal fishes. When that analysis is complete the results will be compared with trends in other groups of fishes and with theoretical studies of population interactions and consequences of certain life history characteristics such as reproductive biology.

Recreational Fisheries Improvement Task--Spring Tagging and Fish Release Completed

Mr. Roger Green, Fishery Biologist at the Tiburon Laboratory, reported that all of the coho salmon, a total of 5,747 fish, were released this month. Of these, 4,778 were tagged. Average size was 90 with a range of 27 to 746. The exceptionally large size range may have resulted in increased cannibalism explaining the discrepancy between the number released and the 7,500 fish originally installed in the pen last month. Such discrepancies in fish counts, over and above tallied mortalities, have plagued all who have reared salmon in saltwater pens.

An additional 40,000 young coho salmon have been reserved by the California Department of Fish and Game for delivery to the Tiburon Laboratory this summer.

Further plans for a floating breakwater to protect the salmon pens were made. A design was chosen utilizing scrap automobile tires. Initially, mats of these tires will be placed and tethered beneath the existing pier. Application was made to U.S. Army Corps of Engineers for a permit.

Bid Invitations for Printing Contract for Anglers Guide Issued by Government Printing Office

This month the Anglers' Guide was turned over to the Government Printing Office in Seattle, and they have begun issuing bid invitations for the printing contract. Del Harrell, Chief, NMFS Scientific Publications Staff, estimates that it will probably be about 2 months before galleys are received.

Initially, the Superintendent of Documents has ordered only 5,000 copies of the book for sale to the public, however, assurances have been made that if the demand is large enough they will go into a second printing. NMFS plans to pay for 1,450 copies of the Guide for its own distribution.

The Guide describes marine game fish, fishing grounds, and angler facilities all along the U.S. West Coast and around Hawaii, American Samoa, and Guam, and is co-authored by James L. Squire, Jr., Fishery Biologist, at the La Jolla Laboratory and Susan Smith, Publications Specialist at Tiburon.

Information Gathered on Historical Changes in Fishing Tackle and Methods

This month Publications Specialist Susan Smith wrote to some leading tackle manufacturers asking if they could provide any information on the history of important changes in fishing tackle and methods, changes that may have affected the efficiency of California saltwater anglers, especially over the past 30 years. So far seven replies have been received most of them very helpful. It appears that the following have had a great impact on saltwater angling since the later 1940's: 1) introduction of monofilament line, which replaced linen and nylon line, 2) introduction of spinning tackle and later refinements in both spinning and revolving spool reels, and 3) introduction of fiberglass rods, which replaced bamboo and steel rods.

FOREIGN JOURNALISTS VISIT SOUTHWEST FISHERIES CENTER

Foreign journalists from Japan, People's Republic of China, Greece, Norway, Sweden, Federal Republic of Germany, France, Great Britain, Australia, and Korea visited the Southwest Fisheries Center on March 26. The tour, with the theme, "Resources from the Sea," is part of the U.S. Information Agency effort to develop positive coverage of American life by representative foreign media. Each year about 10 of these tours are conducted, with foreign journalists stationed in New York and Washington participating by invitation. One function of these tours is to take the foreign journalists away from their normal beats to other parts of the United States. Journalists participating in this tour also visited Woods Hole, the Grand Isles off the Gulf Coast and the Scripps Institution of Oceanography.

CROMWELL FAMILY VISITS NAMESAKE VESSEL DURING SAN DIEGO STAY

Members of the family of Oceanographer Townsend Cromwell were recent guests of NOAA Corps Cdr. Merritt Walter and the National Marine Fisheries Service aboard the NOAA research vessel, Townsend Cromwell, in San Diego, California. The Cromwell is based at the Southwest Fisheries Center's Honolulu Laboratory but was on this side of the Pacific to participate in joint research cruises with the NOAA research vessel, David Starr Jordan, assigned to the La Jolla Laboratory, for studies of porpoise distribution and assessment of California Current fisheries resources. Shown in the enclosed photograph on the bridge of the Cromwell are members of the Cromwell family. From left to right, they are:

Mrs. Kim Cromwell Doyle, Mrs. Vicki Cromwell Denson, and Mrs. Carol Cromwell Damen (the three daughters of Townsend Cromwell), Cdr. Merritt Walter, Captain of the Cromwell, Mrs. Merritt Walter, Mrs. Richard Cromwell, Mr. Richard Cromwell (brother of Townsend Cromwell), and Mrs. Kay Cromwell (widow of Townsend Cromwell).

Townsend Cromwell, after whom the ship was named after he was killed in a plane crash in Mexico in 1958 while enroute to a scientific expedition, was the discoverer of an equatorial undercurrent in the Pacific Ocean which also bears his name. Cromwell's discovery of the undercurrent came 100 years after every major ocean surface current had been observed. The new undercurrent proved to be as large as the Gulf Stream and throusands of miles greater in length.

PUBLIC RELATIONS - SOUTHWEST FISHERIES CENTER

On March 5 Honolulu Laboratory Director Richard Shomura participated in a Bicentennial "Makahiki Kai" (Festival of the Sea) panel discussion on the present and future methods of skipjack tuna fishing, held at Blaisdell Center in Honolulu. Areas covered were future harbor development, bait problems, experiences on a commercial skipjack tuna fishing vessel, and marketing and commercial aspects.

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On March 9, Mr. Al Pirey and a biology class from Helix High School in La Mesa, visited the La Jolla Laboratory to attend a lecture given by Dr. Eric Barham on deep-diving submersibles, and the scattering layer.

On March 24 and 25 classes from Hands On! School and Learning Center, Mill Valley visited the Tiburon Laboratory to observe silver salmon being tagged. Also, the school was loaned the Sea Grant film on the pen rearing operation. To date, seven letters expressing their thanks and interest have been received from the elementary school children.

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For the record, Honolulu Laboratory Librarian Hazel Nishimura wishes to acknowledge the continued generous assistance of Mr. Dan Gittings, librarian at the SWFC La Jolla library, in procuring items for the Honolulu Laboratory that are not available locally. Because of his kind cooperation, the HL library is able to fulfill nearly every request it receives.

HONORS AND AWARDS

Drs. William Lenarz, William Fox, Gary Sakagawa, and Brian Rothschild received notification from Director Schoning this month that their paper, "Examination of the yield per recruit basis for a minimum size regulation for Atlantic yellowfin tuna, Thunnus albacares," has been awarded the NMFS Outstanding Publication Award as the best publication appearing in a 1974 issue of the Fishery Bulletin. In his accompanying letter, Mr. Schoning wrote, "Only those publications which documented outstanding and original scientific work were eligible. The paper certainly met this requirement, and it is with pleasure and pride that we recognize you for this outstanding effort." The authors also shared a $300 award.

March 10 - Maxwell B. Eldridge, Tiburon Laboratory, Cash Award.

SEMINARS

Honolulu Laboratory

March 26 - Mr. Harvey R. Bullis, Jr., Director, SEFC, Miami, spoke on "Aerospace remote sensing technology in fisheries" at the East-West Center. Arrangements for this seminar were made by Dr. Robert Skillman, Honolulu Laboratory Seminar Chairman.

La Jolla Laboratory

March 29 - Mr. Andrew Bakun, Pacific Environmental Group, NMFS, Monterey, California, spoke on "Ocean surface drift and the fishery environment."

Training

March 10-12 - Alice A. Jellett, of the Tiburon Laboratory "Better Office Skills and Services."

16-18 - Walburga L. Giguere Tiburon Laboratory "Personnel Management for Personnel Assistants."

29-30 - Sally Kuba of the Honolulu Laboratory attended a Time Sharing Option Class given at the University of Hawaii Computing Center.

30-31 - Walburga L. Giguere Tiburon Laboratory "FOIA and Privacy Act Seminar."

Spring Quarter

Special Topics in Applied Population Dynamics, University of California, San Diego: Messrs. David Au, Al Coan, Joe Caruso, Richard Evans, Wayne Perryman, attendees from the La Jolla Laboratory.

MEETING AND TRAVEL

March 2 - Acting Director Izadore Barrett traveled to Seattle, Washington to meet with Drs. Alverson and Wilimovsky on preliminary places for a meeting concerning world fisheries data and their management.

March 4 - Mr. David Mackett, Center Planning Officer, traveled to Terminal Island with Dr. W. Fox to discuss tuna/porpoise matters with the Regional Office staff.

March 6 - Prof. Axel Nygren, University of Uppsala, Sweden, visited the Honolulu Laboratory to discuss aquaculture projects.

March 8-12 - Mr. Don Aasted, Honolulu Laboratory, NMFS, visited the Tiburon Laboratory to discuss the Tiburon Anchovy project with Mr. Roger Green.

March 9 - Dr. W. Fox traveled to San Francisco to participate in an Environmental Defense Fund-sponsored panel discussion on porpoise and to discuss the Center's Porpoise Research Program.

March 10-11 - Messrs. D. Mackett and G. Stauffer traveled to Long Beach for a State/Federal Technical Committee meeting.

March 11 - Mr. Mickey Eldridge, Mr. Jeff O'Neill, and Mr. Mike Bowers visited the California Department of Fish and Game's Elk Grove Hatchery to work out details for acquiring striped bass eggs of rearing experiments and for the collections of ovarian egg, blood, muscle and spermatozoa samples for other studies.

March 11 - Meeting with Tyee Club and members of the Tiburon Laboratory to discuss salmon tagging plans.

March 16-17 - Mr. Mackett in Portland, Oregon for coastwide data system meeting.

March 18-19 - Mr. Barrett in Tiburon, California to discuss administrative and scientific matters with the director and staff of the Tiburon, Laboratory.

SWFC Hosts Special Meeting of IWC on Sperm Whales - At the invitation of the U.S. government, 16 scientific advisers to the International Whaling Commission met at the Southwest Fisheries Center in La Jolla, California from March 16-25, to discuss the status of sperm whales. The meeting was chaired by Dr. Ray Gambell of the Whales Research Institute who is the newly-appointed Secretary of the International Whaling Commission. The U.S. representatives to this meeting included Drs. William Perrin and William Fox of the La Jolla Laboratory, Dr. Douglas Chapman of the University of Washington; Dr. Michael Tillman of the NMFS Northwest Fisheries Center and Dr. Tim Smith of the University of Hawaii (formerly of the Southwest Fisheries Center). Dr. William Aron, Director of NOAA's Office of Ecology and Environmental Conservation, also joined the group at mid-week. Conclusions and recommendations drawn by the advisory group will be reported to the International Whaling Commission meeting in June 1976 in London.

The IWC meeting was followed by an FAO Ad Hoc Group I Meeting on Large Whales, March 26-28, chaired by Dr. S. J. Holt, Fisheries and Environment Adviser in charge of marine mammals project.

March 20-April 2 - Mr. Shomura departed Honolulu March 20 for Nairobi, Kenya, to participate in the Biological Seminar and Workshop of the Cooperative Investigations in the North and Central Western Indian Ocean (CINCWIO), March 25-April 1.

March 21-24 - Dr. Edmund Hobson of the Tiburon Laboratory traveled to Washington, D.C. to attend the annual meeting of the Wildlife Society and to receive the Society's Fisheries Publication Award for 1976, for his paper "Trophic relations among teleostean fishes on coral reefs in Kona, Hawaii."

25 - Mr. Mackett at Long Beach for State/Federal Technical Committee meeting.

25-26 - Dr. Paul Struhsaker represented the Honolulu Laboratory at the Aquatic Food Services Panel of the World Food and Nutrition Study of the U.S. National Academy of Sciences/National Research Council convened at the East-West Center.

25-27 - Honolulu Laboratory Librarian Hazel Nishimura attended the annual meeting of the Pacific Southwest Regional Medical Library Service on March 25. She also attended the Hawaii Library Association Annual Spring Conference on March 26 and 27.

29 - Mr. Mackett in San Francisco for State/Federal Technical Committee project review.

- Dr. Fox traveled to Washington, D.C. to brief Congressman Leggett and his subcommittee on aspects of the Center's porpoise research program.

- Mr. Norman Abramson, Dr. Edmund Hobson, Mr. Roger Green and Mr. Susumu Kato of the Tiburon Laboratory attended a State/Federal Technical Committee meeting at the Rodeway Inn, S.F., to enable project leaders involved with both State and Federal fisheries projects to inform each other of objectives, plans and current activities. Mr. Mackett of the La Jolla Laboratory also attended this meeting.

VISITORS

Honolulu Laboratory

March 2 - Mr. Malcolm Castle, CSIRO, Sydney.

3 - Drs. Tommy Nakayama and Gilbert Stoewsand, Department of Food Science and Technology, University of Hawaii.

4 - Mr. Alvin M. Morgan, Inter-Oceanic Factors, Long Beach, California.

9 - Dr. John J. Stephan, Professor, Japanese History, University of Hawaii.

10 - Cdr. Charles K. Townsend, Commanding Officer, NOAA Ship Rainier.

11 - Mr. J. F. T. Saur, Scripps Institution of Oceanography, c/o SWFC, La Jolla, California.

16 - Messrs. Clifford H. Fiscuss and Robert L. DeLong, Marine Mammal Division, NWFC, Seattle, and Ancel M. Johnson, Division of Cooperative Research, Fish and Wildlife Service, Department of the Interior, Anchorage, Alaska.

18 - Mr. Maurice E. Stansby, NWFC, Seattle, Washington.

La Jolla Laboratory

1 - Messrs. Rod Conti and David Smith, U.S. General Accounting Office, Seattle, Washington. Mr. Maurice Stansby, Northwest Fisheries Center, Seattle, Washington.

4 - Mr. Don Aasted, NMFS, Honolulu, Hawaii.

4-5 - RADM H.R. Lippold, Jr., C.R. Hitz, H. Shek, W. Etter, and E. Jones, NOS Pacific Marine Center, Seattle, Washington.

10 - Mr. Buck Redman, NOAA, OFO, Rockville, Maryland.

16 - Mr. Ted Lau, Newsweek Magazine, San Diego, California.

- Mr. Bruce McAlister, Northwest Fisheries Center, Seattle, Washington.

22 - Dr. and Mrs. William Royce, Seattle, Washington.

23 - Mr. L. Alan Collins, NMFS Panama City, Florida.

25 - Messrs. George Barber, K. Brunos, H. Sphlen, Mr. Chris Norgaard, Del Monte Corp., San Francisco, California.

29 - Messrs. Andrew Kemmerer, and P.C. Cook, NMFS, Bay St. Louis, Mississippi.

- Mr. Paul N. Sund, NMFS Pacific Environmental Group, Tiburon, California.

- Mr. H.F. Stich, Cancer Research Center, University of British Columbia, Vancouver, B.C.

Tiburon Laboratory

8 - Don Aasted, Honolulu Laboratory, NMFS, Honolulu, Hawaii.

11 - G.H. Fisher, Ocean Systems, Research, San Diego, California.

- Bob Brown, TYEE Club, San Francisco, California.

12 - Paul Reilly, Calif. Dept. of Fish and Game, Menlo Park, California.

- Paget Leh and Patricia Eklund, U.S. Army Corps of Engineers, Sausalito, California.

17 - Mike Laurs, Southwest Fisheries Center, La Jolla, CA,Clyde Miller, Miller and Olson Construction, Novato, CA

18 - Peter Dewees, Gerald Ward, Don Scoble, Margaret Bradbury, Sam Elkina, San Francisco State University, S.F., CA

19 - Izadore Barrett, Acting Director, Southwest Fisheries Center, La Jolla, CA

23 - Steve Cagan, San Francisco State University, S.F., CA

- David Street, Moss Landing Marine Laboratory, Moss Landing, CA

PERSONNEL

March 14 - Mr. Roy Allen, Illustrator - Promotion - La Jolla

- Ms. Nancy Wiley, Computer Programmer, Promotion - La Jolla

- Ms. Nancy La Roche, Secretary, Promotion - La Jolla

- Mr. Richard Dyer, Computer Aid, Temporary Appointment - La Jolla

- Ms. Carol Sanchez, Biological Technician - Promotion - La Jolla

15 - Thomas C. Byles, Biological Aid (Fisheries), conversion to Full-Time Permanent status - Honolulu Laboratory.

25 - Mr. Oden Burris, Computer Programmer, Career-Conditional Appointment (part-time) - La Jolla.

- Dr. William Lenarz, Fishery Biologist - Reassignment to Tiburon Laboratory.

30 - Lt. Theodore C. Kaiser, NOAA Corps officer, entered on duty at the Honolulu Laboratory.

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